## REMARKS

Claims 1-18 and 20-42 were presented for examination and were rejected.

The applicants have amended claims 1-6, 25, 39, 40, and 41 to address the indefiniteness rejection.

The applicants respectfully request reconsideration in light of the amendments and the following comments.

### Claim Objections

Claim 6 was objected to because claims 4 and 6 allegedly recited the exact same limitations.

The applicants direct the Examiner's attention to the integrand in claim 6, which integrand includes the term V(λ). This term is not present in claim 4. The two claims are in fact different. The applicants, therefore, respectfully submit that the objection is traversed.

### 35 U.S.C. § 112, Second Paragraph, Rejection of Claim 1-42

Claims 1-42 rejected under 35 U.S.C. § 112, Second Paragraph, as being indefinite.

The applicants have amended claims 1-6, 25 and 41 based on the original wording of the claims, making it clear that either limitation in question applies.

The applicants have also amended claim 39 based, in part, on the original wording of the claim, making it clear that either process satisfies the claim.

For these reasons, the applicants respectfully submit that the rejection is overcome.

### 35 U.S.C. § 103 Rejection of Claims 1-13, 15-16, 25-28, 33, 35 and 40

Claims 1-13, 15-16, 25-28, 33, 35, and 40 were rejected under 35 U.S.C. § 103 as being unpatentable over Noguchi, U.S. Patent Publication 2004/0051950 A1 (hereinafter "Noguchi") in view of Haaland et al., WO 01/09647 (hereinafter "Haaland"). The applicants respectfully traverse the rejection.

Claim 1 recites:

> **1.** An electro-optical element (1) comprising a substrate (2) and at least one electro-optical structure (4) which comprises an active layer with at least one organic, electro-optical material (61), the substrate having at least one antireflection coating (8, 10) with at least one layer, wherein the antireflection coating (8, 10) layer has a thickness and a refractive index for which the integral reflectivity at the boundary faces of the antireflection coating is minimal for light beams emerging from the active layer at all angles for a wavelength in the spectral region of the emission spectrum, or for which the integral reflectivity is at most 25% higher than the minimum, the integral reflectivity being the reflectivity which is integrated over all the emission angles of light beams which emerge from the active layer, at the boundary faces of the antireflection coating.

Noguchi discloses an anti-reflection coating, *e.g.,* for a display panel. However, in Noguchi the reflection- and the transmission-coefficients for three different wavelengths (or wavelength bands) are maximized or minimized, respectively. The thicknesses of the individual coatings are located in the typical range of < A/4*n. So, only reflection of these three discrete wavelengths (or wavelength bands) is suppressed by the coating.

Furthermore, Noguchi discloses a light source that emits only in these three wavelengths. The anti-reflection coating is optimized in such a way that the display achieves a high contrast (the reflection form the light source is suppressed while the transmission of the display light is enhanced).

Meanwhile, Haarland discloses an anti-reflection coating for a broad wavelength range for spectacles. Wavelength and viewing directions dependencies are accounted for. The optimization is done with a formula similar to that defined in present claim 2 but with different integration limits. The integration limits of the formula in present claim 2 correspond to the consideration of all angles according to present claim 1. Thus, the integration limits are important for the present invention.

Present claim 1 defines that the integral reflectivity is minimized (or close to the minimum reflectivity achievable) for all angles for a wavelength in the spectral region of the emission spectrum. This corresponds to a consideration of light beams emitted within the entire solid angle. In contrast thereto, integration according to Haarland is carried out over an angle of only up to 60° due to the limited viewing angle of the human eye—refer, for example, to Figs. 3-5, 6A, 12, and 13, and page 16, line 27.

The applicants submit that a person skilled in the art would also have no motivation to enlarge the integration angle. There would be no advantage to optimize the coating for incidence angles larger than the viewing angle.

In particular, large polar angles contribute to a larger extent to the optimization of a coating (*i.e.,* to the value of an integral according to formula 1 in claim 1) according to the invention. This is due to the fact that the solid angle element integrated over the azimuthal angle increases with the polar angle. In other words, the light of the OLED is predominantly emitted into solid angle elements of large polar angles. The optimization as defined in claim 1 then results in an optimization predominantly for this light emitted at large polar angles. Therefore, the antireflection effect of the coating is in general not optimal for small polar angles, *i.e.,* angles which are within the human viewing angle, or of light beams emitted perpendicular to the substrate, respectively. Thus, if a person skilled in the art would increase the integration angle to calculate the integral according to claim 1 of Haarland, the antireflection effect would decrease. Therefore, <u>a person skilled in the art would refrain from optimizing the coating by calculating an integration over a polar angle of between 0 and pi/2</u> (corresponding to a integration of all the emission angles of light beams, as defined in claim 1).

Additionally, the anti-reflection coating of Haarland consists of different already known anti-reflection coatings. The best sequences for the individual anti-reflection coatings are obtained due to a parameter run. That means that a huge group of different sequence coatings is evaluated. The best of the sequences is chosen as the final anti-reflection coating. The thickness for the anti-reflection coatings are located in the typical range of $< \lambda/4*n$. According to present claim 1, one layer of the coating (including the case of a single layer coating) is optimised for minimum reflectivity at its boundary faces. In contrast, Haarland optimizes the multilayer-system as a whole. In other words, <u>Haarland fails to disclose that a single layer of the layer system has a minimum or optimised reflectivity</u>.

Neither Noguchi nor Haarland, nor any of the other references for that matter, considers the thickness or the index of refraction of the coating in the same way as defined in present claim 1. Moreover, the thickness of the layer in the present invention is typically considerably greater than $\lambda/4*n$.

For these reasons, the applicants respectfully submit that the rejection of claim 1 is traversed.

Because claims 2-13 and 15-16 depend on claim 1, the applicants respectfully submit that the rejection of them is also traversed.

Claim 25 recites:

> **25.** A method for manufacturing an organic, electro-optical element (1), comprising:
>
> - coating at least one side (21, 22) of a substrate (2) with an antireflection coating (8, 10),
>
> and
>
> - applying at least one electro-optical structure (4), which comprises at least one organic, electro-optical material (61), where the substrate is coated with an antireflection coating (8, 10) which has at least one layer with a thickness and a refractive index for which the integral reflectivity at the boundary faces of the antireflection coating (10) for light beams emerging for all angles in the active layer and for a wavelength in the spectral range of the emitted light is minimal or for which the integral reflectivity is at most 25 percent higher than the minimum, the integral reflectivity being the reflectivity which is integrated over all the emission angles of light beams which emerge from the active layer, at the boundary faces of the antireflection coating.

For the reasons discussed above and with respect to the rejection of claim 1, the applicants respectfully submit that the rejection of claim 25 is traversed as well.

Because claims 26-28, 33, 35, and 40 depend on claim 25, the applicants respectfully submit that the rejection of them is also traversed.

Claim 41 recites:

> **41.** A substrate comprising an antireflection coating (8, 10) with at least one layer, wherein the antireflection coating layer has a thickness and a refractive index for which the integral reflectivity at the boundary faces of the antireflection coating is minimal for light beams emerging from the active layer at all angles for a wavelength in the spectral region of the emission spectrum, or for which the integral reflectivity is at most 25% higher than the minimum, the integral reflectivity being the reflectivity which is integrated over all the emission angles of light beams which emerge from the active layer, at the boundary faces of the antireflection coating.

For the reasons discussed above and with respect to the rejection of claim 1, the applicants respectfully submit that claim 41 should be allowed as well.

Because claim 42 depends on claim 41, the applicants respectfully submit that claim 42 is also allowable.

**<u>35 U.S.C. § 103 Rejection of Claim 14</u>**

Claim 14 was rejected under 35 U.S.C. § 103 as being unpatentable over Noguchi in view of Haaland, and further in view of Yamauchi as applied to claim 1, U.S. Patent Publication 2004/0160165 A1 (hereinafter "Yamauchi").

Yamauchi discloses a method to enhance the extraction efficiency from a display panel. Contrary to the present invention as defined in claim 1, this is done in Yamauchi neither by adjusting the surface thickness nor the index of refraction. Only the border sides of the individual pixel elements are structured in such a way that light the for the first time is impeded by leaving the display surface due to the total reflection on the display surface is reflected on the side of the pixel elements that it can leave the display surface.

In any event, because claim 14 is dependent on claim 1 and because Yamauchi fails to cure the deficiencies of Noguchi and Haaland with respect to the rejection of claim 1, the applicants respectfully submit that the rejection of claim 14 is also traversed.

**35 U.S.C. § 103 Rejection of Claims 17-18 and 36-38**

Claims 17-18 and 36-38 were rejected under 35 U.S.C. § 103 as being unpatentable over Noguchi in view of Haaland as applied to claims 1 and 25, and further in view of Duffy et al., U.S. Patent Publication 2004/0134233 A1 (hereinafter "Duffy").

Because claims 17-18 are dependent on claim 1 and because Duffy fails to cure the deficiencies of Noguchi and Haaland with respect to the rejection of claim 1, the applicants respectfully submit that the rejection of them is also traversed.

Because claims 36-38 are dependent on claim 25 and because Duffy fails to cure the deficiencies of Noguchi and Haaland with respect to the rejection of claim 25, the applicants respectfully submit that the rejection of them is also traversed.

**35 U.S.C. § 103 Rejection of Claims 20, 24, 29, 31-32, 34 and 39**

Claims 20, 24, 29, 31-32, 34, and 39 were rejected under 35 U.S.C. § 103 as being unpatentable over Noguchi in view of Haaland as applied to claim 1 and 25, and further in view of Ikegaya et al., U.S. Patent Publication 2001/0049005 A1 (hereinafter "Ikegaya").

Ikegaya discloses an anti-reflection coating for a display panel. The reflection efficiency is increased by roughening of the intermediated surface. Due to the enhanced scattering of this surface the contrast between the disturbing light sources surrounding the display and reflections in the display surface itself are reduced. The thickness for the anti-reflection coatings lies in the typical range of $< \lambda/4*n$.

In any event, because claims 20 and 24 are dependent on claim 1 and because Ikegaya fails to cure the deficiencies of Noguchi and Haaland with respect to the rejection of claim 1, the applicants respectfully submit that the rejection of them is also traversed.

Because claims 29, 31, 32, 34, and 39 are dependent on claim 25 and because Ikegaya fails to cure the deficiencies of Noguchi and Haaland with respect to the rejection of claim 25, the applicants respectfully submit that the rejection of them is also traversed.

**35 U.S.C. § 103 Rejection of Claim 21**

Claim 21 was rejected under 35 U.S.C. § 103 as being unpatentable over Noguchi in view of Haaland in view of Ikegaya as applied to claim 20, and further in view of Obayashi et al. U.S. Patent Publication 2003/0120008 A1 (hereinafter "Obayashi").

Obayashi discloses an anti-reflection coating, possibly for a display panel. It deals with a selection of appropriate polymers as material with the additional capability to be scratch resistant and so on, instead of enhancing light out-coupling efficiency from the display panel. The thickness for the anti-reflection coatings are in the order of $< \lambda/4*n$.

In any event, because claim 21 is dependent on claim 20 and because Obayashi fails to cure the deficiencies of Noguchi, Haaland, and Ikegaya with respect to the rejection of claim 20, the applicants respectfully submit that the rejection of claim 21 is also traversed.

**35 U.S.C. § 103 Rejection of Claim 30**

Claim 30 was rejected under 35 U.S.C. § 103 as being unpatentable over Noguchi in view of Haaland as applied to claim 25, and further in view of Obayashi.

Because claim 30 is dependent on claim 25 and because Obayashi fails to cure the deficiencies of Noguchi and Haaland with respect to the rejection of claim 25, the applicants respectfully submit that the rejection of claim 30 is also traversed.

**Request for Reconsideration Pursuant to 37 C.F.R. 1.111**

Having responded to each and every ground for objection and rejection in the last Office action, applicants respectfully request reconsideration of the instant application pursuant to 37 CFR 1.111 and request that the Examiner allow all of the pending claims and pass the application to issue.

If there are remaining issues, the applicants respectfully request that Examiner telephone the applicants' agent so that those issues can be resolved as quickly as possible.

Respectfully,
Clemens Ottermann et al.

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